particular stylus used. For example, in an electronic white-board application, different styli may correspond to different colors; depending on whether the electronic white-board is combined with a display technology, the styli may or might not also double as markers applying, physical (in contrast to "electronic") ink to the touch surface.

[0561] The dual-mode algorithm may be combined with other techniques to further categorize the nature of the touch. For example, the time duration of the touch perturbation may be used to help distinguish different styli via the size of the contact area between the sensor and the stylus tip, as is considered in claim 10 of European Patent Application 9411927.7. The stylus tip may be vibrated at a signature frequency, e.g. 100 Hz, in order to modulate the magnitude of the touch perturbation is a fashion that can be recognized by a controller algorithm. These and other methods may be combined with the dual-mode algorithm to more reliability or more completely characterize the nature of a touch perturbation.

[0562] Here "stylus" generalizes to anything that results in a touch. For example, consider an acoustic sensor per this invention built into the bottom of a drip pan. More particular imagine that liquid drops are sensed by both ZOHPS and flexural (lowest-order anti-symmetric Lamb) waves. The ratio of ZOHPS to flexural perturbation magnitudes is larger for a high viscosity oil drop than a low viscosity gasoline drop.

[0563] As an example of an analog output of a dual-mode algorithm, consider again the above drip-pan application. The ratio of ZOHPS signal perturbation, a measure of viscosity, to the flexural wave perturbation, a measure of leaky-wave attenuation which is weakly dependent on viscosity, is a measure of viscosity. Hence with a dual-mode algorithm, this invention supports viscosity measurement. It is known that blood-count is strongly correlated with blood viscosity, so a "drip pan" blood-count sensor may provide a portable sensor with fast response in this case the sensor substrate may be a glass slide and the operating frequency may be above 5 MHz to reduce size and increase resolution.

[0564] In a blood drop viscosity measurement system, the reflective arrays may be formed as a screened frit on the glass slide or as an etched or ground structure. However, where the slide is disposable, the transducers may be provided separately and as a part of a permanent fixture. Thus, the transducers are pressed tightly against the glass during testing to couple the acoustic waves, without a permanent adhesive bond.

Example 23

[0565] As shown in FIGS. **32**(a)(**1**) and **32**(b)(**2**), an adaptive threshold determination scheme may be implemented with regional variations to optimize the sensitivity of the touchscreen without causing undue errors. This adaptive threshold scheme has two slightly different aspects. First, during initialization, the system rapidly acquires sufficient data to allow perturbation detection. Then, after initialization, the threshold is adaptively updated, excluding portions of the sensor for which significant perturbations are detected.

[0566] Thus, the system initially seeks to determine a baseline input **3201**, presumably in the absence of touch, for each available subsystem. During initialization, the system may also detect and ignore significant transient perturbations which may be due, for example, to premature touches, and thus the processing scheme for the first and second aspects of the adaptive baseline processing may be merged. The baseline characteristics are stored **3202**. It is noted that this baseline characteristic data is generally stored separately for each sensor subsystem of the device. Based on the stored baseline characteristics for each sensor subsystem, a statistical analysis of the normal variations, instability and noise may be made, which may provide a basis for setting a margin between the normal baseline and a threshold **3203**. The threshold may vary based on a signal space of the sensor subsystem, based on the baseline stability in a given region of the sensor or time delay after transducer excitation **3204**. In a normal operational mode, the baseline is determined **3206**, without reference to detected perturbations **3205**, and adaptively updated **3207**. In addition, the baseline stability characteristics **3208** and threshold **3209**, which may each vary based on a position or region of the sensor, and for each available sensor subsystem, are also adaptively updated.

[0567] According to the present invention, a single emitted acoustic wave may give rise to a plurality of received signals, representing different transducer subsystems. Therefore, as shown in **FIG. 32**(*b*), a received signal may be analyzed for resolution of information relating to a plurality of sensor subsystems **3211**, **3213**, **3215**. The system will generally sequentially measure the signals from each available sensor subsystem **3210**. However, in some cases, available redundancy may allow the sensor to operate in the absence of data from one or more sensor subsystems. Further, at any given point in time, sufficient data may be available for certain analyses, even though a complete mapping of the sensor for each subsystem is not complete.

[0568] If the received signal is above the threshold for a given position and subsystem **3212**, which, for example in a phase sensitive receiver embodiment, is evaluated **3216** as $\sqrt{((\Delta I)^2+(\Delta Q)^2)}-\text{Threshold (position, subsystem)}>0$, further analysis ensues **3217**. Otherwise, no perturbation is deemed detected **3218**, and the system continues to receive and analyze further data, e.g., from the next sensor subsystem **3220**. On the other hand, if the data from a sensor subsystem is superthreshold, a significant perturbation is detected, and this information passed **3219** to higher level, baseline analysis, or other algorithms.

[0569] As shown in **FIG. 32**(*c*), after data for some or all available sensor subsystems is obtained from the perturbation detection algorithm **3221**, a determination may be made whether sufficient data is available to proceed with analysis **3222**, which may differ for the various algorithms. Further analysis of the perturbations according to the present invention may then be performed, as appropriate, including an anti-shadow algorithm **3223**, a multiple touch/redundancy algorithm **3224**, and a consistency algorithm **3225**. Normally, the size and shape of a perturbation will also be analyzed **3226**, to allow an optimal output coordinate to be calculated. If sufficient perturbation data is received and analyzed **3227**, which as stated above need not include all the data, or data from each sensor subsystem, then a further process ensures that a coordinate representation of the perturbation(s) are normalized into a desired output coordinate space **3228**. The actual normalization or coordinate transformation may be performed at various points in the process, and indeed various portions of the process may